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(71) Applicant: **ACE DI BARBUI DAVIDE & FIGLI S.R.L.**
20025 Legnano, Milano (IT)

(72) Inventors:
- **BARBUI, Daniele**
  I-20025 Legnano, MILANO (IT)
- **BARBUI, Maurizio**
  I-20025 Legnano, MILANO (IT)

(74) Representative: **Leihkauf, Steffen Falk et al**
Jacobacci & Partners S.p.A.
Via Senato, 8
20121 Milano (IT)

(54) **ANTISTATIC DEVICE FOR A DEDUSTING HEAD FOR A STRIP MATERIAL TRANSFORMATION LINE AND DEDUSTING HEAD HAVING SAID ANTISTATIC DEVICE**

(57) An antistatic device (1, 201, 301) for a dedusting head (100, 400) having at least one air duct (101, 102), for a strip material transformation machine, comprising: a housing (2, 202, 302) comprising a low voltage power supply inlet (3); at least one tip deionization electrode (10) associated with said housing (2, 202, 302); at least one engagement body (20) interposed between said housing (2, 202, 302) and a respective said at least one tip deionization electrode (10) so as to arrange said at least one tip deionization electrode (10) inside said at least one air duct (101, 102); an electrical circuit (30) arranged inside said housing (2, 202, 302) and connected to said low voltage power supply inlet (3) and to said at least one electrode (10), said electrical circuit (30) comprising a high electrical voltage generator (40) arranged inside said housing (2) and configured to generate a high electrical voltage inside said housing (2, 202, 302) to be supplied to said at least one deionization electrode (10).

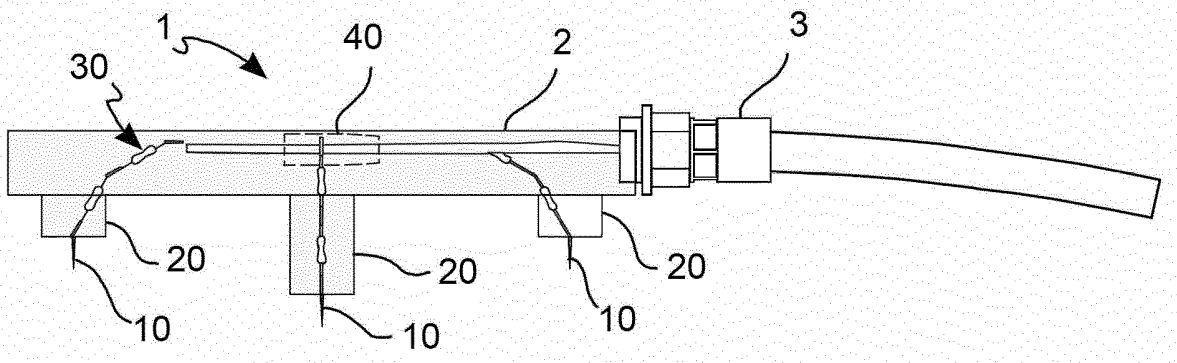

FIG. 6

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Description

Field of the invention

[0001] The present invention relates to an antistatic device for a dedusting head for a line for the transformation of strip material, for example paper or film made of plastic material, to counteract the accumulation of electrostatic charges in the dust deriving from the processing of the strip material itself.

Background art

[0002] In the industry of the processing of strip material, for example of paper, such strip material, initially collected on a reel upstream of a processing line, is passed along a plurality of processing stations arranged in sequence to one another along said line, between the entrance and exit of the line itself.

[0003] Among the processing stations, for example, printing stations and cutting, laminating/coating, and/or embossing, stations etc. may be mentioned.

[0004] Many of these stations produce particles of material, and/or dust, which tend to separate from the strip material and contaminate the working environment, the machines and the devices which make up the production line, but also the strip material itself during the processing.

[0005] It should be noted that, in the case of a strip material transformation line, the strip slides between the various processing stations, sometimes becoming electrostatically charged, both due to contact sliding as well as to the exposure to electric or electromagnetic fields.

[0006] The presence of strong electromagnetic fields at the aforesaid stations, in conjunction with the accumulation of dust, significantly increases the risk of fire and explosion.

[0007] The need is therefore felt to accurately and completely remove the particles and the dust which are produced during the processing of the strip material along the processing line.

[0008] To this end, a dedusting head for a strip material processing line, for example paper in a strip form, is known, having a lower head body and an upper head body facing each other, between which the strip material is free to slide according to a predefined sliding direction.

[0009] The lower head body and the upper head body comprise ducts configured to convey suction and/or blowing air flows to remove dust from the strip material being processed.

[0010] This type of known dedusting head has some disadvantages, including the risk of dust accumulation inside the suction ducts associated therewith, due to the electrostatic charges present on the dust.

[0011] The dust produced by the processing, in fact, is often electrostatically charged due to the rubbing friction therebetween during the processing and during the path thereof up to the inside of the suction ducts. The resulting electrostatic attraction leads the dust particles to accumulate in accumulation areas, forming compact agglomerates which tend to clog the suction ducts arranged in the dedusting head or connected to the head itself.

[0012] The presence of high-intensity electromagnetic fields in the working environment at the dust accumulation areas contributes to the risk of fire in such accumulation areas.

[0013] The need is therefore felt to provide an antistatic device for a dedusting head for a line for the transformation of strip material, for example paper, capable of neutralizing the electrostatic charges associated with the dust particles flowing through the suction ducts of the dedusting head or connected thereto.

[0014] Furthermore, in order to improve the dedusting efficiency, the need is felt, at the same time, to facilitate the detachment from the strip material of the dust particles formed during the processing, neutralizing the strip material itself together with the suction action.

Summary of the invention

[0015] It is the object of the present invention to devise and provide an antistatic device for a dedusting head for a strip material transformation machine, which allows the aforesaid requirements to be met and the aforesaid drawbacks to at least partially be obviated with reference to the prior art.

[0016] In particular, it is an object of the present invention to provide an antistatic device for a dedusting head for a line for the transformation of strip material, for example paper, capable of neutralizing the electrostatic charges associated with the dust particles flowing through the suction ducts of the dedusting head or connected thereto.

[0017] Furthermore, it is an object of the present invention to provide an antistatic device for a dedusting head, capable of facilitating the detachment from the strip material of the dust particles formed during the processing, neutralizing the electrostatic charges associated with the strip material itself, together with the suction action.

[0018] These and further objects and advantages are achieved by means of an antistatic device for a dedusting head for a strip material transformation machine, as well as by a dedusting head comprising at least one such antistatic device, in accordance with the independent claims.

[0019] Further objects, solutions, and advantages are present in the embodiments described below and claimed in the dependent claims.

Brief description of the drawings

[0020] The invention will be shown below by describing some embodiments thereof by way of non-limiting example, with reference to the accompanying drawings, in which:

- Figure 1 shows a perspective view of an embodiment of a linear antistatic device according to the invention;
- Figure 2 shows a side view of the antistatic device of Figure 1;
- Figure 3 shows a bottom view of the antistatic device of Figure 1;
- Figure 4 shows a top view of the antistatic device of Figure 1;
- Figure 5 shows a front view of the antistatic device of Figure 1;
- Figure 6 shows a side view of the antistatic device of Figure 1, shown in transparency to diagrammatically illustrate some internal components;
- Figure 7 shows a perspective view of a dedusting head according to the invention, comprising four linear antistatic devices of Figure 1 mounted at the opposite ends of the dedusting head, near the opposite ends of the suction and blowing ducts contained inside the dedusting head;
- Figure 8 shows a perspective view of an end support assembly of the dedusting head of Figure 7, comprising two linear antistatic devices of Figure 1;
- Figure 9 shows a front view of the end support assembly of Figure 8;
- Figure 10 shows a side view of the support assembly of Figure 8;
- Figure 11 shows a top view of the support assembly of Figure 8;
- Figures 12 and 13 respectively show a top and a bottom perspective view of a second embodiment of the antistatic device according to the invention, in which the body of the device has a toroidal or annular shape;
- Figure 14 shows a side view of the annular antistatic device of Figure 12, associated with a suction duct;
- Figure 15 shows a top view of the annular antistatic device of Figure 14;
- Figures 16 and 17 respectively show a top and a bottom perspective view of the second embodiment of the antistatic device, associated with a blowing duct;
- Figure 18 shows a side view of the annular antistatic device of Figure 16;
- Figure 19 shows a bottom view of the annular antistatic device of Figure 18;
- Figure 20 shows a perspective view of another embodiment of a dedusting head, having two annular antistatic devices of Figure 14 associated with respective suction ducts, and an annular antistatic device of Figure 16 associated with a blowing duct;
- Figure 21 shows a side view of the dedusting head of Figure 20;
- Figure 22 shows a profile view of the dedusting head of Figure 21.

Description of preferred embodiments

[0021] With reference to the Figures, an antistatic device according to the invention is indicated as a whole with reference numbers 1, 201, 301, for a dedusting head 100, 400 having at least one air duct 101, 102, for a strip material transformation machine.

[0022] The antistatic device 1 comprises a housing 2, 202, 302 comprising a low voltage power supply inlet 3 and at least one tip deionization electrode 10 associated with said housing 2, 202, 302 and at least one engagement body 20 interposed between said housing 2, 202, 302 and a respective said at least one tip deionization electrode 10, so as to be able to arrange said at least one tip deionization electrode 10 inside said at least one air duct 101, 102.

[0023] In accordance with an embodiment, the engagement body 20 is adapted to engage with a corresponding through seat 121, 122 obtained in said dedusting head 100 so that said at least one electrode 10 may be arranged inside said at least one air duct 101, 102.

[0024] The antistatic device 1 further comprises an electrical circuit 30 arranged inside said housing 2, 202, 302 and connected to said low voltage power supply inlet 3 and to said at least one electrode 10, said electrical circuit 30 comprising a high electrical voltage generator 40 arranged inside said housing 2 and configured to generate a high electrical voltage inside said housing 2, 202, 302 to be supplied to said at least one deionization electrode 10.

[0025] In other words, the electric generator 40 is powered by the low voltage power supply and generates a high electrical voltage that it supplies to the deionization electrodes.

[0026] In accordance with an embodiment, the aforesaid low voltage preferably has a value of about 24 Volts.

[0027] According to other embodiments, the aforesaid low voltage may have a value between about 6 Volts and 24 Volts, or of about 12 Volts.

[0028] In accordance with an embodiment, the aforesaid high electrical voltage has a value between about 5000 Volts and 10000 Volts, preferably of about 7000 Volts.

[0029] In accordance with an embodiment, the housing 2, 202, 302 comprises a hollow body 4 with a box-like shape with an open side, forming thereinside a compartment configured to accommodate said electrical circuit 30 and said high electrical voltage generator 40.

[0030] The housing 2, 202, 302 may further comprise a cover 5 configured to close, preferably in a removable manner, said open side.

[0031] In accordance with an embodiment, the antistatic device 1, 201, 301 comprising fastening means 6 to fasten said housing 2, 202, 302 with respect to said dedusting head 100, 400.

[0032] For example, such fastening means 6 may comprise perforated portions for the fastening by means of screws to an end support of the head body 105, 106, as

shown in Figures 1-6, or perforated tabs for the fastening to a support sleeve as shown in Figures 12-19, which may be mounted as part of a suction duct or of a blowing duct connected to the head.

[0033] In accordance with an embodiment, for example shown in Figures 1-6, said housing 2 has a linear elongated shape and mainly extends along a housing axis S.

[0034] In accordance with an embodiment, all said at least one engagement body 20 have an elongated shape along a respective engagement body axis A, parallel to one another so as to allow the insertion of said at least one engagement body in corresponding through seats to arrange said at least one tip deionization electrode 10 inside said at least one air duct 101, 102, for example by sliding along said engagement body axis.

[0035] In accordance with an embodiment, the engagement body axes A are equally spaced apart from one another.

[0036] In accordance with an embodiment, the at least one tip deionization electrode 10 is formed by three tip deionization electrodes 10, and said at least one engagement body 20 is formed by three respective engagement bodies 20.

[0037] The engagement body axes A of such three engagement bodies 20 are preferably parallel to each other, lying on the same lying plane, equally spaced apart from one another. Preferably, the two end engagement bodies of such three engagement bodies are configured to be inserted into corresponding through seats in corresponding suction ducts, while the central or intermediate body is configured to be inserted into a corresponding through seat in a blowing duct.

[0038] According to an embodiment, the two end engagement bodies have equal length measured along the respective engagement body axis, while the central or intermediate engagement body has a length greater than that of the two end engagement bodies, measured along the engagement body axis.

[0039] In accordance with an embodiment, the housing 2 has an elongated shape and extends along a housing axis S arranged transversely, preferably orthogonally, to said engagement body axis A.

[0040] In accordance with an embodiment, all said at least one tip deionization electrode 10 extend along respective tip axes coinciding with said engagement body axes A.

[0041] In accordance with an embodiment, the engagement body axes A lie on the same lying plane comprising said housing axis S.

[0042] In accordance with another embodiment, for example shown in Figures 12-19, said housing 202, 302 has a toroidal or annular shape, defining a central axis C and extends along a circumferential line coaxial to, and lying on a plane orthogonal to said central axis C, said toroidal antistatic device 201, 301 being adapted to be arranged about, and coaxial to, a respective said air duct 101, 102.

[0043] In accordance with an embodiment, all said at least one tip deionization electrode 10 extend along respective tip axes arranged radially with respect to said central axis C towards said central axis C.

[0044] In accordance with an embodiment, all said tip axes lie on the same lying plane comprising said circumferential line.

[0045] According to another aspect of the present invention, the aforesaid objects and advantages are achieved by a dedusting head 100, 400 for a strip material transformation line, having at least one air duct 121, 122, and comprising at least one antistatic device 1, 201, 301 according to the features described above, associated with at least one of said at least one air duct 101, 102 so as to position said at least one tip electrode 10 inside said at least one air duct 101, 102.

[0046] In accordance with an embodiment, the at least one air duct 101, 102 comprises at least one suction duct 101 having a suction opening facing a passage 107 of said dedusting head 100, 400 configured to allow the sliding of said strip material into said passage 107 according to a predefined sliding plane P and a predefined sliding direction S belonging to said predefined sliding plane P, said suction opening being configured to allow a suction air flow from said passage 107 to said at least one suction duct 101, in which said at least one antistatic device 1, 201, 301 has at least one tip electrode 10 arranged inside said suction duct 101 so as to be hit by said suction air flow downstream of said suction opening.

[0047] In other words, the suction duct has the purpose of conveying a suction flow which carries the dust particles therewith in the suction duct to a dust collection station for disposal.

[0048] The presence of the tip electrodes of the antistatic device inside the suction duct and downstream of the suction opening allows the electrostatic charge of the suctioned dust particles to be neutralized or deionized. This allows avoiding the electrostatic accumulation of dust inside the suction duct.

[0049] In accordance with an embodiment, the at least one air duct 101, 102 comprises at least one blowing duct 102 having a blowing opening facing said passage 107 of said dedusting head 100, 400, said blowing opening being configured to allow a blowing air flow from said at least one blowing duct 102 to said passage 107, in which said at least one antistatic device 1, 201, 301 has at least one tip electrode 10 arranged inside said blowing duct 102 so as to be hit by said blowing air flow upstream of said blowing opening.

[0050] The presence of the tip electrodes in the blowing duct has a different purpose with respect to that of the suction duct.

[0051] The tip electrodes are upstream with respect to the outlet opening, or blowing opening. Therefore, they ionize the air before exiting the blowing opening. This ionized air vigorously hits the surface of the strip material which is sliding in front of the blowing opening. This ionized air neutralizes the electrostatic charge accumulated

on the surface of the strip material, contributing to, and facilitating, the removal of the dust particles from the strip material. Therefore the ionized blow neutralizes the strip material, not the dust particles.

[0052] In accordance with an embodiment, as in the case of the linear ionization device shown in Figures 1-6, each tip electrode 10 of each antistatic device 1 is arranged inside a different suction duct 101 or blowing duct 102.

[0053] In accordance with an embodiment, the dedusting head 100 comprises at least one head body 105, 106 comprising two suction ducts 101 and one blowing duct 102 interposed between said two suction ducts 101, said two suction ducts 101 and said blowing duct 102 having axes parallel to each other and coplanar, in which said housing 2 has a linear elongated shape and mainly extends along a housing axis S and in which said at least one tip deionization electrode 10 is formed by three tip deionization electrodes 10 in which each of said three tip deionization electrodes 10 is arranged inside one of said two suction ducts 101 and said blowing duct 102, respectively.

[0054] In accordance with an embodiment, the at least one antistatic device 1 is formed by two antistatic devices 1 located at both opposite free ends of said two suction ducts 101 and said blowing duct 102, as shown, for example, in Figure 7.

[0055] In accordance with an embodiment, the at least one head body 105, 106 is a lower head body 105 and an upper head body 106 associated with the lower head body 105 so as to form a passage 107 between said lower head body 105 and said upper head body 106, configured to allow the sliding of said strip material in said passage 107 according to a predefined sliding plane P and a predefined sliding direction S belonging to said predefined sliding plane P.

[0056] In accordance with an embodiment, said at least one engagement body 20 of said at least one antistatic device 1 is inserted and engaged in one of said at least one through seat 121, 122 obtained in said dedusting head 100 so that said at least an electrode 10 is positioned inside said at least one air duct 101, 102.

[0057] The at least one engagement body 20 of said at least one antistatic device 1 is inserted and engaged in one of said at least one through seat 121, 122 obtained in said dedusting head 100 so that said at least an electrode 10 is positioned inside said at least one air duct 101, 102.

[0058] In accordance with an embodiment, the head 100 comprises a lower head body 105, an upper head body 106 associated with the lower head body 105 so as to form a passage 107 between said lower head body 105 and said upper head body 106, configured to allow the sliding of said strip material in said passage 107 according to a predefined sliding plane P and a predefined sliding direction S belonging to said predefined sliding plane P.

[0059] The lower head body 105 defines a lower body operating surface 185, and said upper head body 106 defines an upper body operating surface 186, in which said lower body operating surface 185 and said upper body operating surface 186 face each other on opposite sides with respect to said sliding plane P and define said passage 107 therebetween.

[0060] At least one of said lower head body 105 and said upper head body 106 comprises, inside, said at least one air duct 101, 102, each said at least one air duct 101, 102 defining a respective opening in said operating surface 185, 186 of said at least one of said lower head body 105 and said upper head body 106 and facing said passage 107 to generate an air flow between said at least one air duct 101, 102 and said passage 107.

[0061] Said at least one through seat 121, 122 passes through said at least one of said lower head body 105 and said upper head body 106 transversely to said at least one air duct 101, 102.

[0062] In accordance with an embodiment, said at least one through seat 121, 122 passes through said at least one of said lower head body 105 and said upper head body 106 at one of, or both, opposite ends 115, 116, 117, 118 of said at least one air duct 101, 102.

[0063] In accordance with an embodiment, one, or both, opposite ends 115, 116, 117, 118 of said at least one air duct 101, 102 comprise a respective end support assembly 131, 132 having a sleeve connection portion 141, 142 as an extension of said at least one air duct 101, 102, in which said through seat 121, 122 is obtained in said respective end support assembly 131, 132.

[0064] In accordance with an embodiment, said at least one air duct 101, 102 comprises at least one suction duct 101 in which said opening is a suction opening, said at least one suction duct 101 being connectable to suction means to generate an air suction flow from said passage 107 to said at least one suction duct 101 through said suction opening.

[0065] In accordance with an embodiment, said at least one air duct 101, 102 comprises at least one blowing duct 102 in which said opening is a blowing opening, said at least one blowing duct 102 being connectable to blowing means to generate an air blowing flow from said blowing duct 102 to said passage 107 through said blowing opening.

[0066] In accordance with an embodiment, said at least one of said lower head body 105 and said upper head body 106 comprises two of said at least one suction duct 101 and one of said at least one blowing duct 102, in which said blowing duct 102 is interposed between said two suction ducts 101 according to the sliding direction S, and in which said at least one of said lower head body 105 and said upper head body 106 comprises said at least one antistatic device 1 having three of said at least one engagement body 20, each said engagement body 20 being inserted and engaged in one said through seat 121, 122 in each of said two suction ducts 101 and said blowing duct 102, at least one of said opposite ends 115, 117, 116, 118 of said two suction ducts 101 and of said

blowing duct 10.

[0067] In accordance with an embodiment, as shown for example in Figures 12-19, all said tip electrodes 10 of each antistatic device 201, 301 are arranged inside the same suction duct 101 or blowing duct 102.

[0068] In accordance with an embodiment, the housing 202, 302 of said at least one antistatic device 201, 301 has a toroidal or annular shape, defining a central axis C and extends along a circumferential line coaxial to, and lying on, a plane orthogonal to said central axis C, each said toroidal or annular antistatic device 201, 301 being arranged about, and coaxial to, a respective one of said suction 101 or blowing ducts 102.

[0069] In accordance with an embodiment, the toroidal or annular antistatic device 201, 301 is associated with a connection sleeve portion connected to said at least one air duct 101, 102.

[0070] Those skilled in the art may make changes and adaptations to the embodiments of the device described above, or replace elements with others which are functionally equivalent in order to meet contingent needs without departing from the scope of the following claims. All the features described above as belonging to a possible embodiment can be implemented irrespective of the other embodiments described.

[0071] It is worth noting that the Figures attached are not necessarily in scale.

[0072] All the features described here may be combined in any combination, except for the combinations in which at least some of such features mutually exclude one another.

Claims

1. An antistatic device (1, 201, 301) for a dedusting head (100, 400) having at least one air duct (101, 102), for a strip material transformation line, comprising:

   - a housing (2, 202, 302) comprising a low voltage power supply inlet (3);
   - at least one tip deionization electrode (10) associated with said housing (2, 202, 302);
   - at least one engagement body (20) interposed between said housing (2, 202, 302) and a respective said at least one tip deionization electrode (10) so as to arrange said at least one tip deionization electrode (10) inside said at least one air duct (101, 102);
   - an electrical circuit (30) arranged inside said housing (2, 202, 302) and connected to said low voltage power supply inlet (3) and to said at least one electrode (10), said electrical circuit (30) comprising a high electrical voltage generator (40) arranged inside said housing (2) and configured to generate a high electrical voltage inside said housing (2, 202, 302) to be supplied to said at least one deionization electrode (10).

2. An antistatic device (1, 201, 301) according to claim 1, wherein said housing (2, 202, 302) comprises a hollow body (4) with a box-like shape with an open side, forming thereinside a compartment configured to accommodate said electrical circuit (30) and said high electrical voltage generator (40), said housing (2, 202, 302) further comprising a cover (5) configured to close said open side, and/or wherein the antistatic device (1, 201, 301) comprises fastening means (6) to fasten said housing (2, 202, 302) with respect to said dedusting head (100, 400).

3. An antistatic device (1, 201, 301) according to at least one preceding claim, wherein said at least one tip deionization electrode (10) is three tip deionization electrodes (10), and said at least one engagement body (20) is three corresponding engagement bodies (20).

4. An antistatic device (1), according to at least one preceding claim, wherein said housing (2) has a linear elongated shape and extends mainly along a housing axis (S) .

5. An antistatic device (1) according to claim 3, wherein all said engagement bodies (20) have an elongated shape along respective engagement body axes (A), parallel to one another so as to allow the insertion of said engagement bodies in corresponding through seats to arrange said tip deionization electrodes (10) inside said at least one air duct (101, 102), and wherein
   all said tip deionization electrodes (10) extend along respective tip axes coinciding with said engagement body axes (A).

6. An antistatic device (1), according to claim 5, wherein the engagement body axes (A) lie on the same lying plane comprising said housing axis (S).

7. An antistatic device (201, 301), according to at least one claim from 1 to 3, wherein said housing (202, 302) has a toroidal shape defining a central axis (C) and extends along a circumferential line coaxial and orthogonal to said central axis (C), said toroidal antistatic device (201, 301) being adapted to be arranged about, and coaxial to, a respective said air duct (101, 102) .

8. An antistatic device (201, 301) according to claim 7, wherein all said tip deionization electrodes (10) extend along respective tip axes arranged radially with respect to said central axis (C) towards said central axis (C).

9. A dedusting head (100, 400) for a strip material trans-

formation line, having at least one air duct (121, 122), and comprising at least one antistatic device (1, 201, 301) according to at least one preceding claim, associated with at least one of said at least one air duct (101, 102) so as to position said at least one tip electrode (10) inside said at least one air duct (101, 102) .

10. A dedusting head (100, 400) according to claim 9, wherein said at least one air duct (101, 102) comprises at least one suction duct (101) having a suction opening facing a passage (107) of said dedusting head (100, 400) configured to allow the sliding of said strip material into said passage (107) according to a predefined sliding plane (P) and a predefined sliding direction (S) belonging to said predefined sliding plane (P), said suction opening being configured to allow a suction air flow from said passage (107) to said at least one suction duct (101), wherein said at least one antistatic device (1, 201, 301) has at least one tip electrode (10) arranged inside said suction duct (101) so as to be hit by said suction air flow downstream of said suction opening, and/or wherein said at least one air duct (101, 102) comprises at least one blowing duct (102) having a blowing opening facing said passage (107) of said dedusting head (100, 400), said blowing opening being configured to allow a blowing air flow from said at least one blowing duct (102) to said passage (107), wherein said at least one antistatic device (1, 201, 301) has at least one tip electrode (10) arranged inside said blowing duct (102) so as to be hit by said blowing air flow upstream of said blowing opening.

11. A dedusting head (100) according to claim 10, wherein each tip electrode (10) of each antistatic device (1) is arranged inside a different suction (101) or blowing duct (102) .

12. A dedusting head (100) according to claim 11, comprising at least one head body (105, 106) comprising two suction ducts (101) and one blowing duct (102) interposed between said two suction ducts (101), said two suction ducts (101) and said blowing duct (102) having axes parallel to each other and coplanar, wherein said housing (2) has a linear elongated shape and mainly extends along a housing axis (S) and wherein said at least one tip deionization electrode (10) is formed by three tip deionization electrodes (10) wherein each of said three tip deionization electrodes (10) is arranged inside one of said two suction ducts (101) and said blowing duct (102), respectively.

13. A dedusting head (100) according to claim 12, wherein said at least one antistatic device (1) is two antistatic devices (1), located at both opposite free ends of said two suction ducts (101) and said blowing duct (102), and/or wherein said at least one head body (105, 106) is a lower head body (105) and an upper head body (106) associated with the lower head body (105) so as to form a passage (107) between said lower head body (105) and said upper head body (106), configured to allow the sliding of said strip material in said passage (107) according to a predefined sliding plane (P) and a predefined sliding direction (S) belonging to said predefined sliding plane (P) .

14. A dedusting head (400) according to claim 10, wherein all said tip electrodes (10) of each antistatic device (201, 301) are arranged inside the same suction (101) or blowing duct (102).

15. A dedusting head (400) according to claim 14, wherein said housing (202, 302) of said at least one antistatic device (201, 301) has a toroidal, or annular shape, defining a central axis (C) and extends along a circumferential line coaxial and orthogonal to said central axis (C), each of said antistatic toroidal devices (201, 301) being arranged about, and coaxial to, a respective one of said suction (101) or blowing duct (102) .

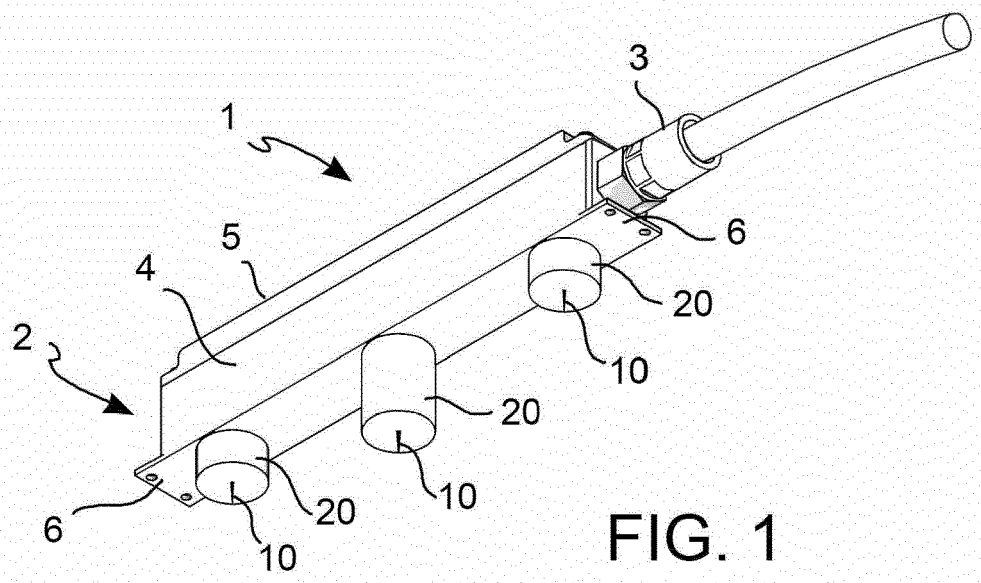


FIG. 1

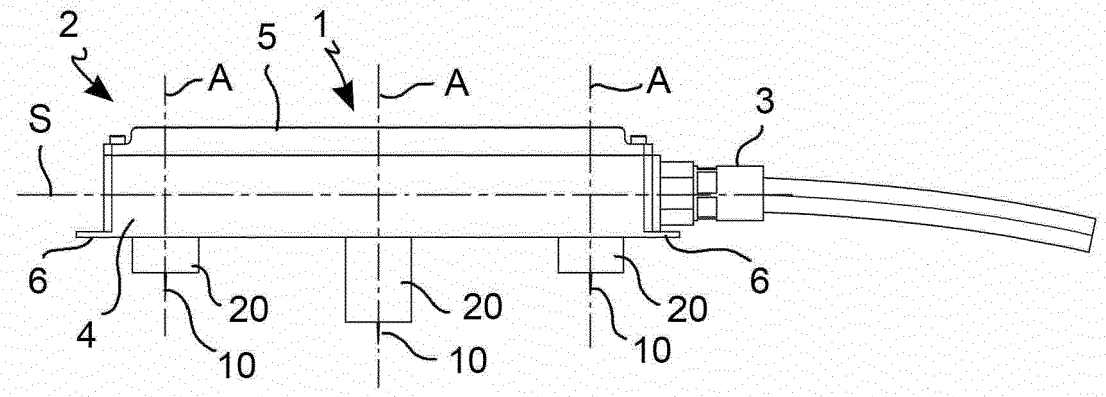


FIG. 2

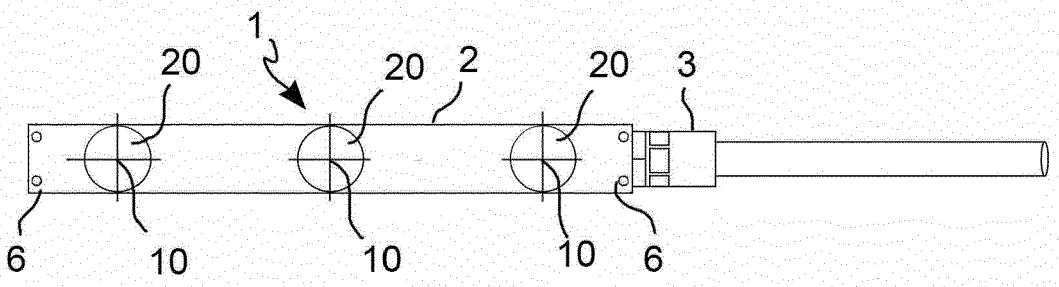


FIG. 3

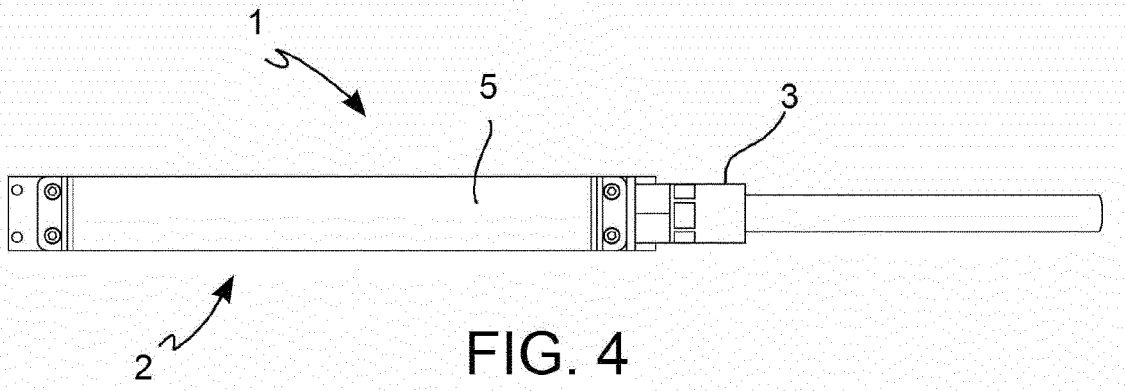


FIG. 4

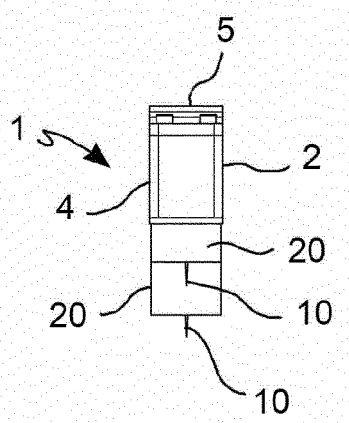


FIG. 5

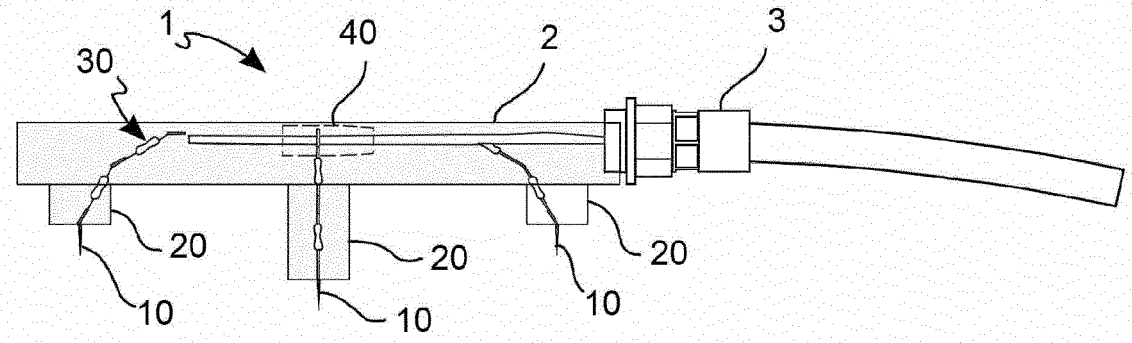
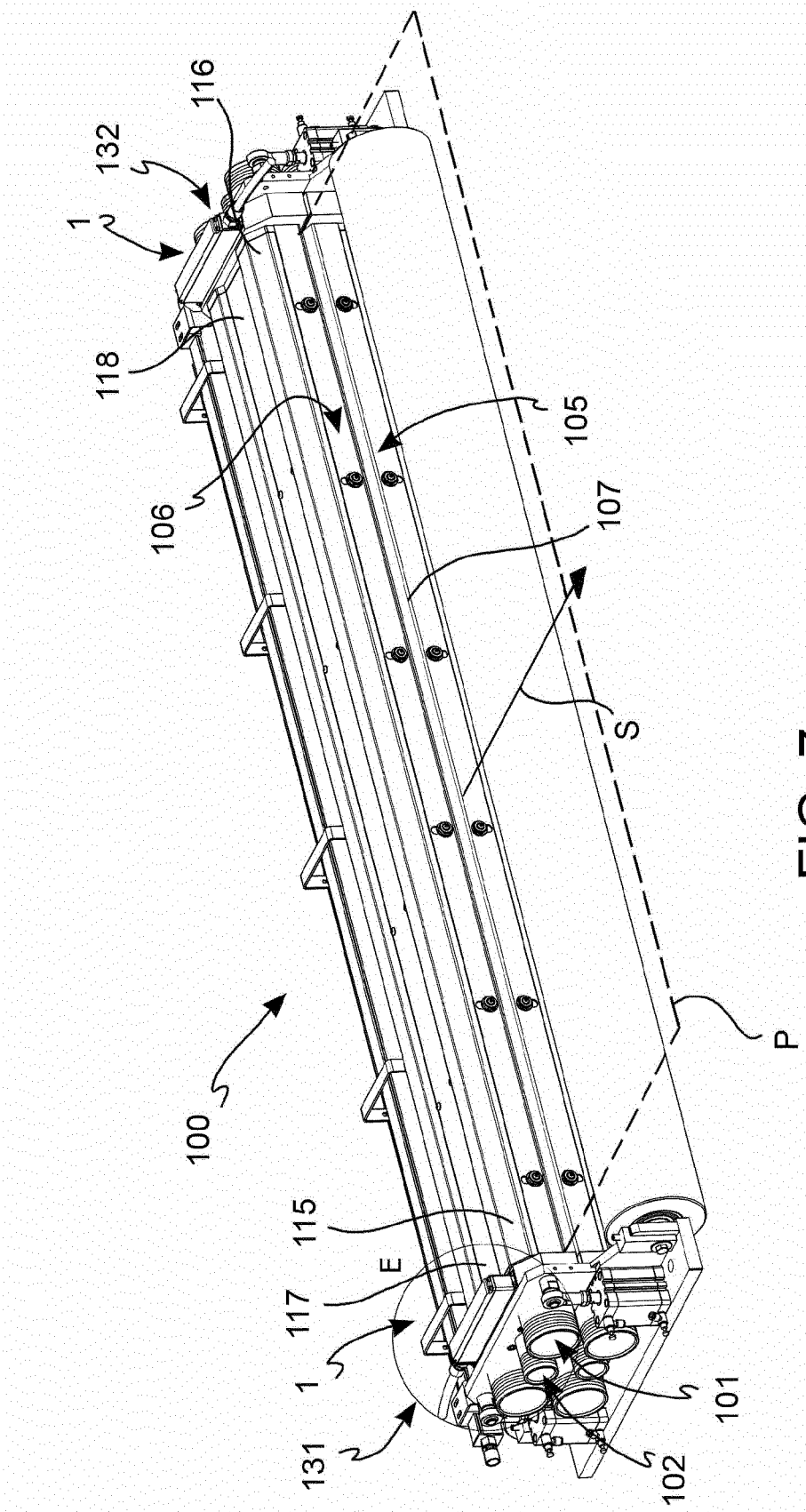


FIG. 6



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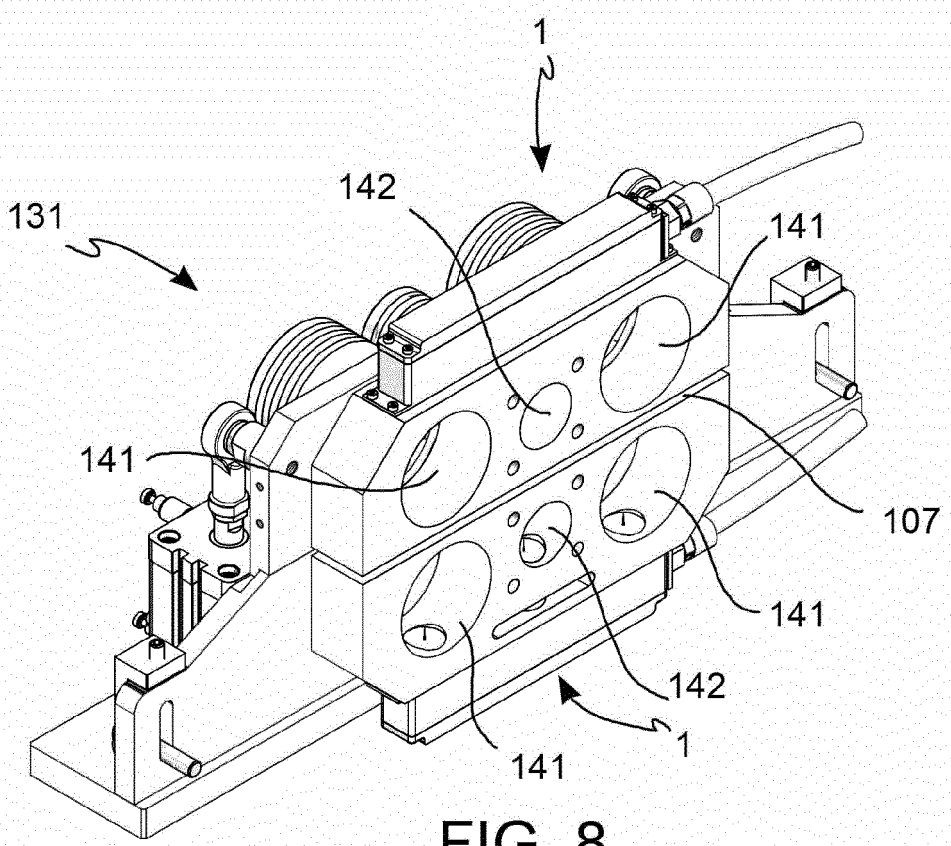
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FIG. 8

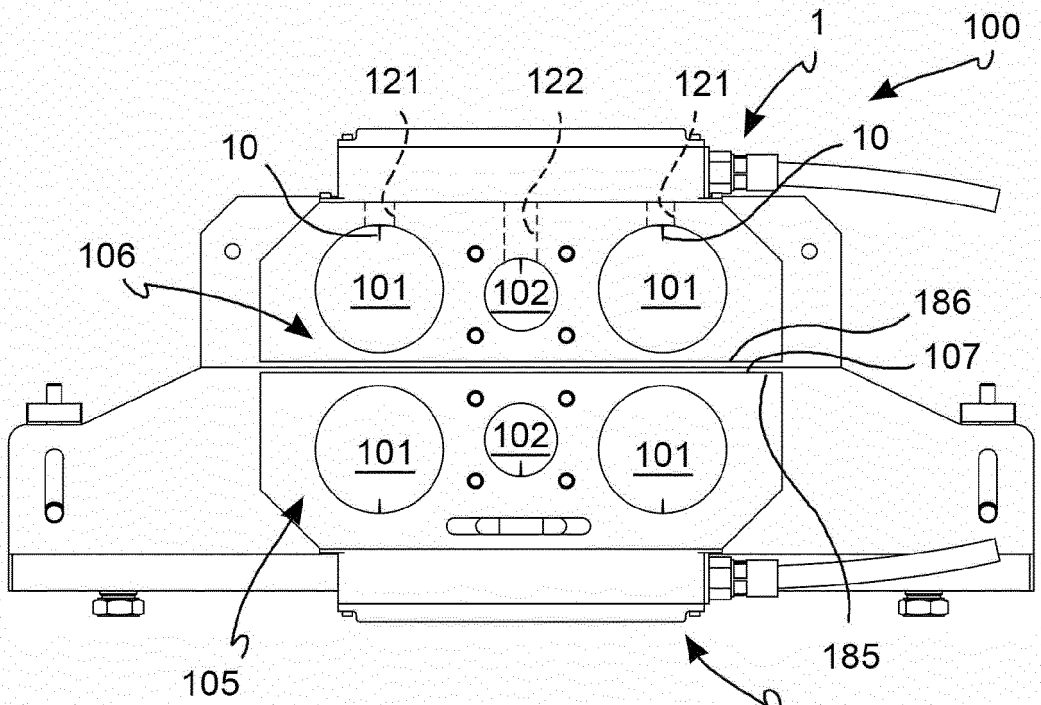
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FIG. 9

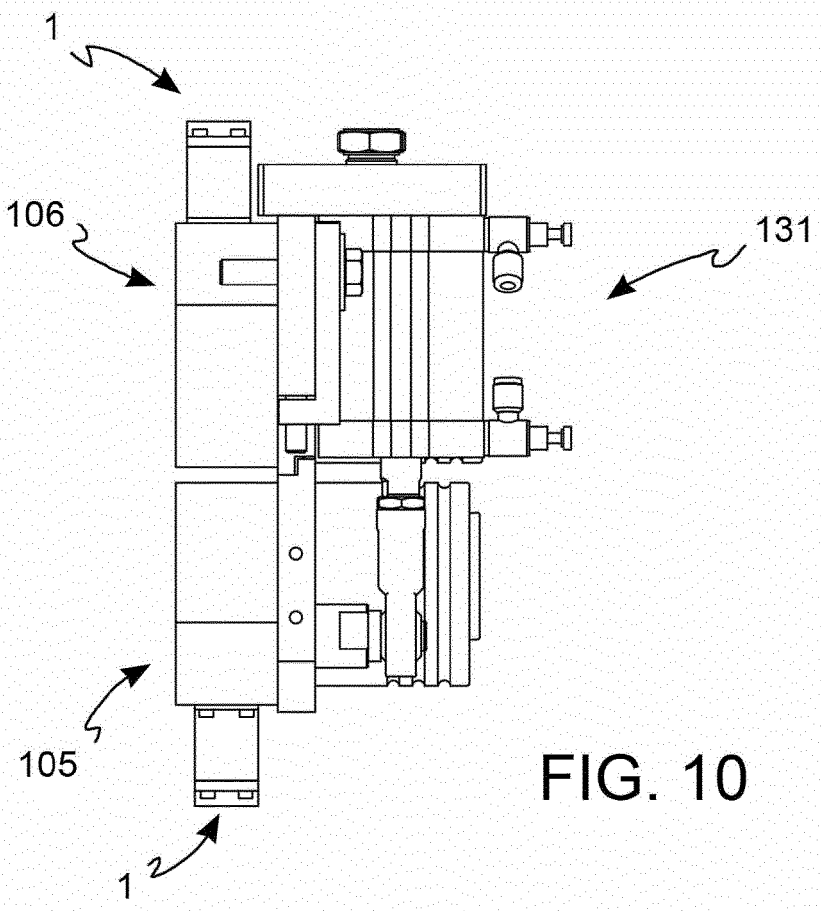

FIG. 10

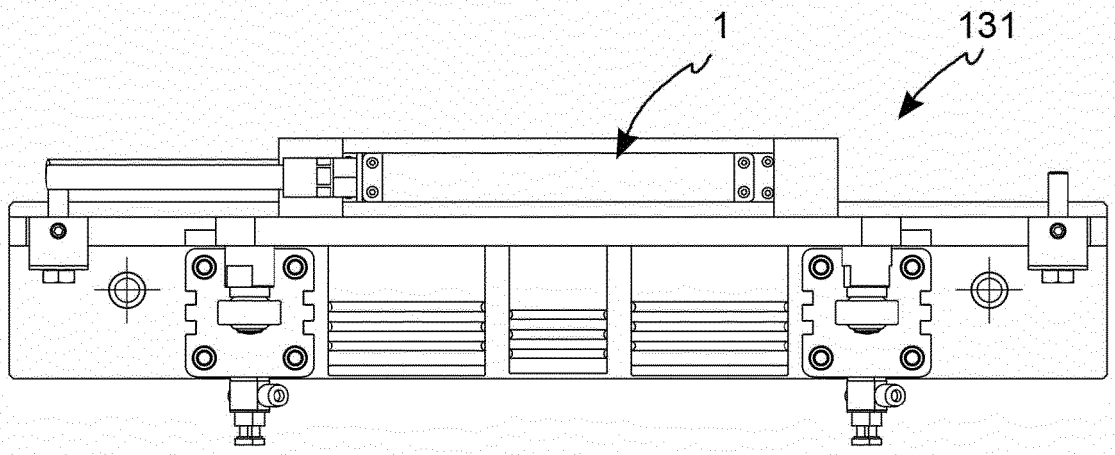

FIG. 11

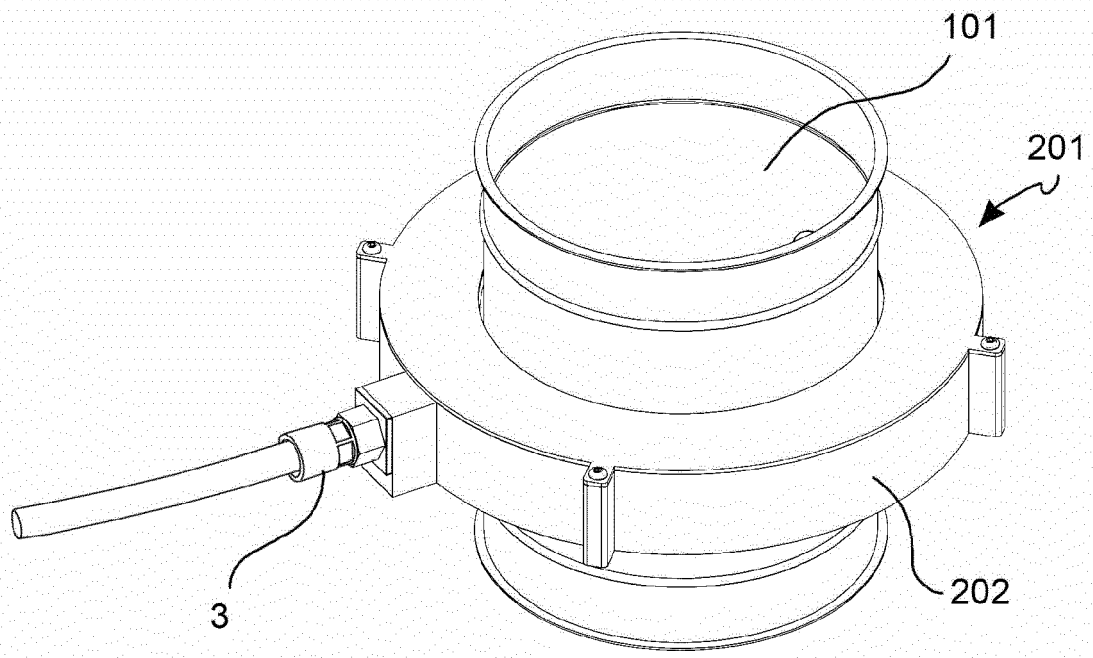

FIG. 12

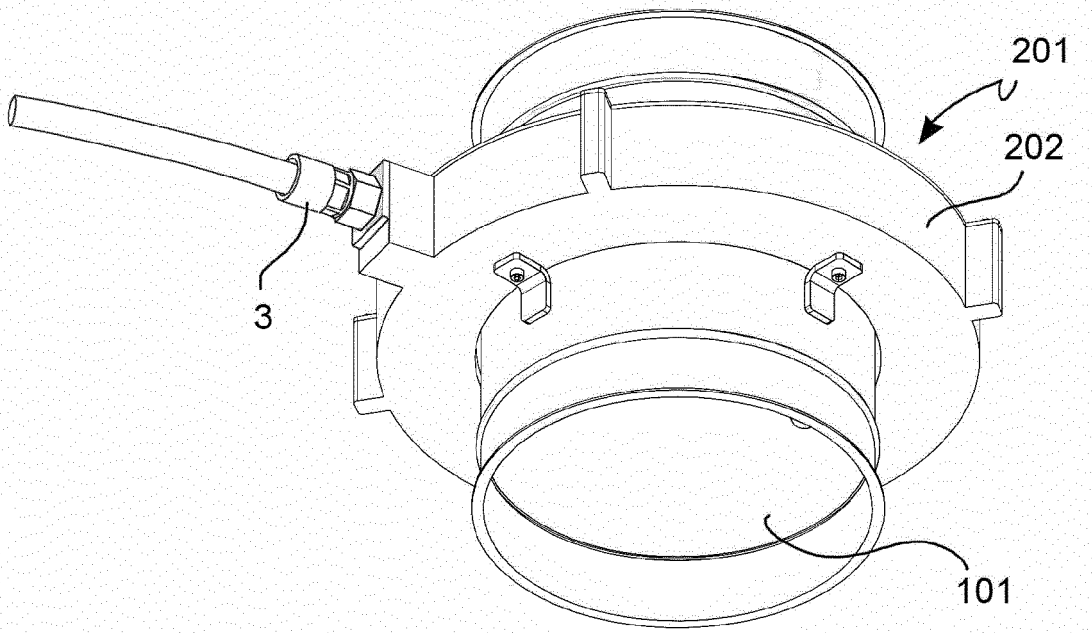

FIG. 13

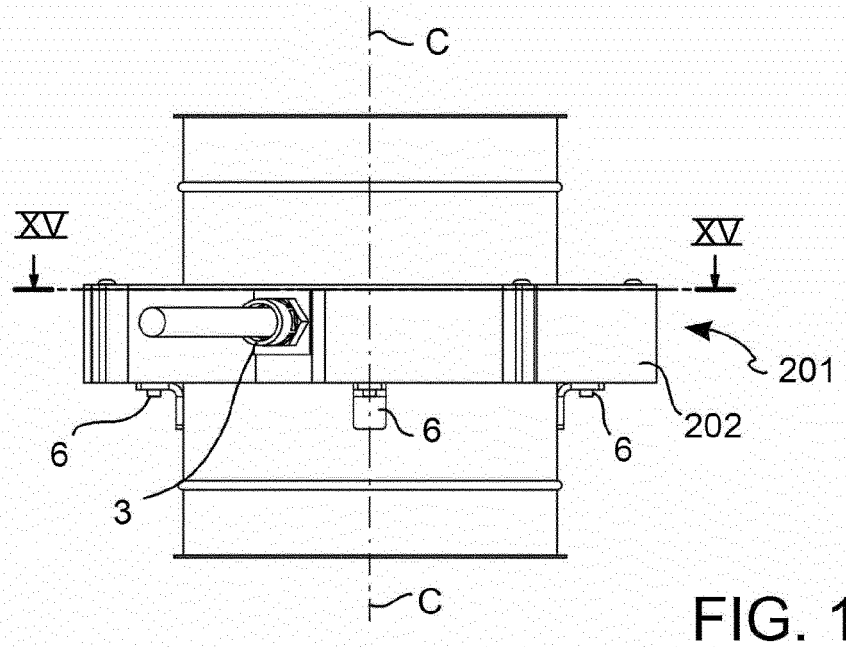

FIG. 14

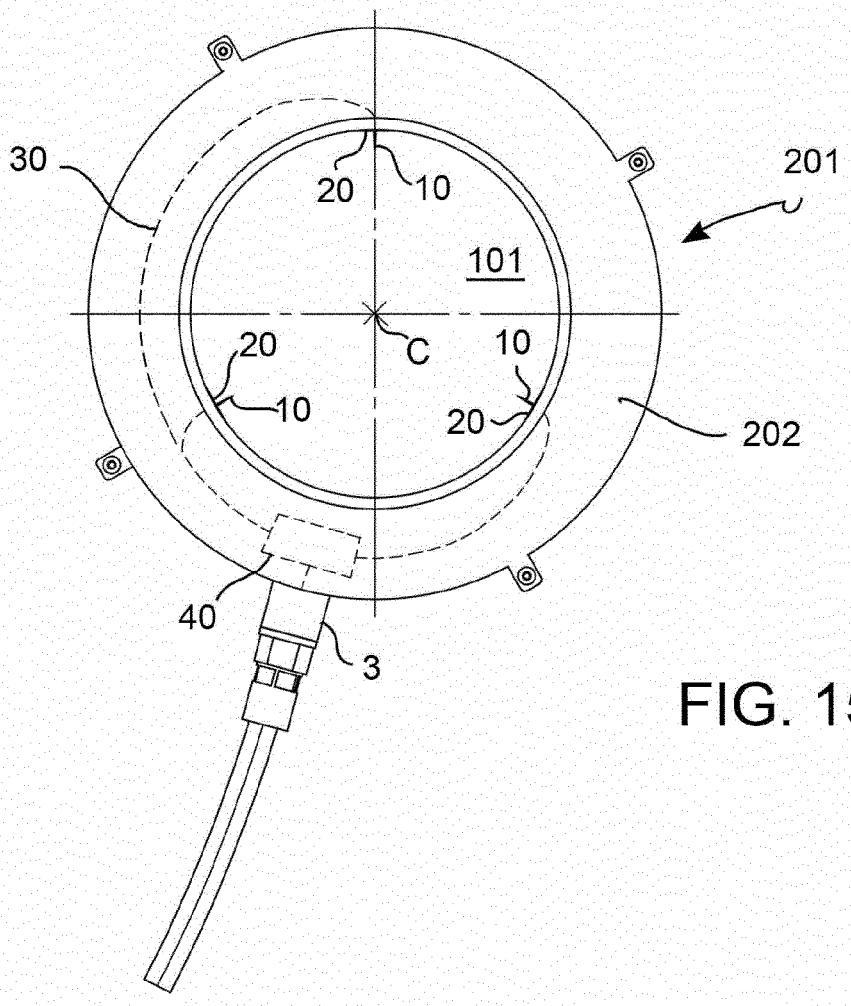

FIG. 15

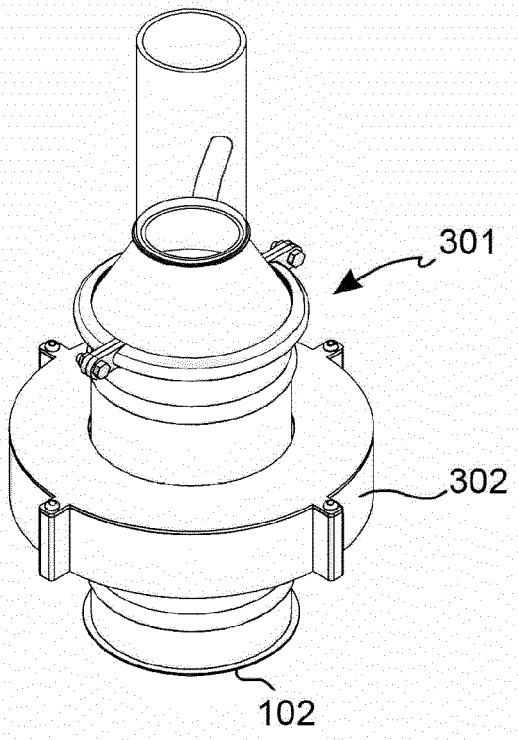

FIG. 16

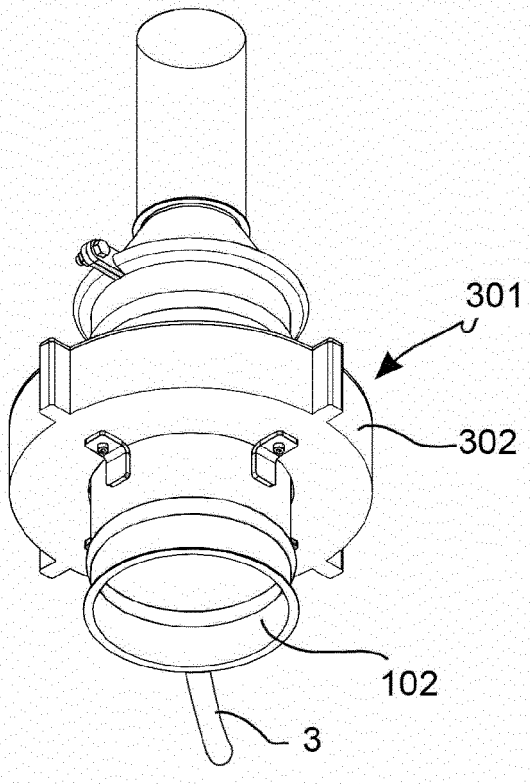

FIG. 17

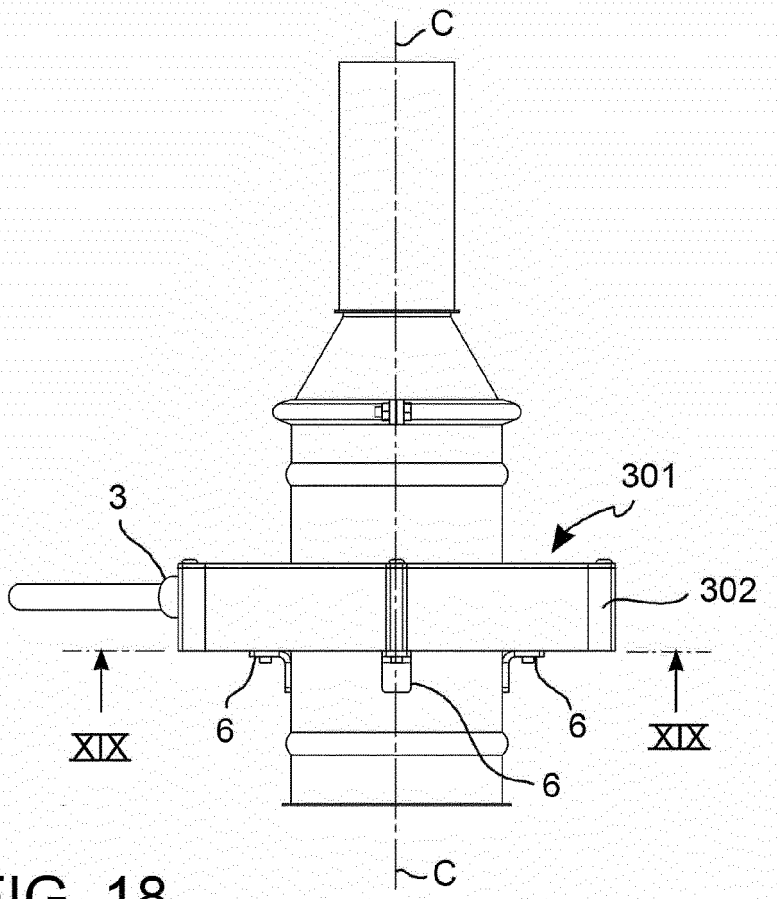

FIG. 18

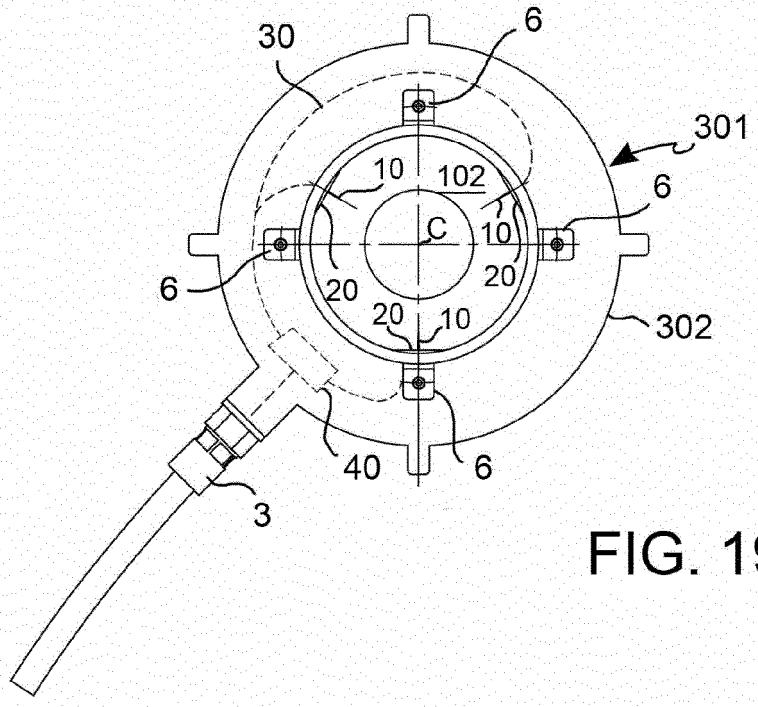

FIG. 19

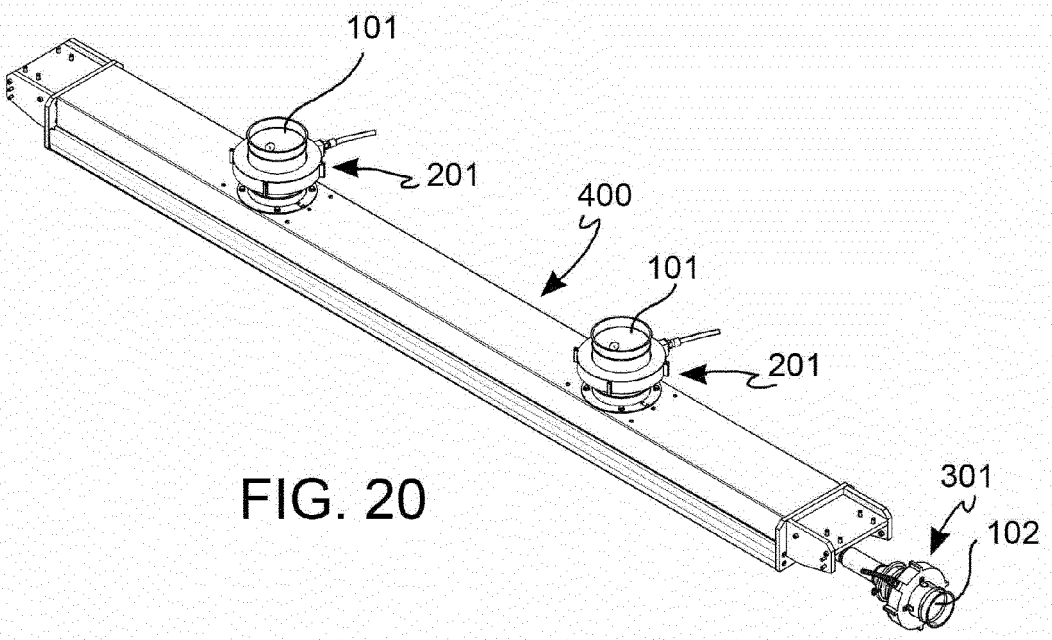

FIG. 20

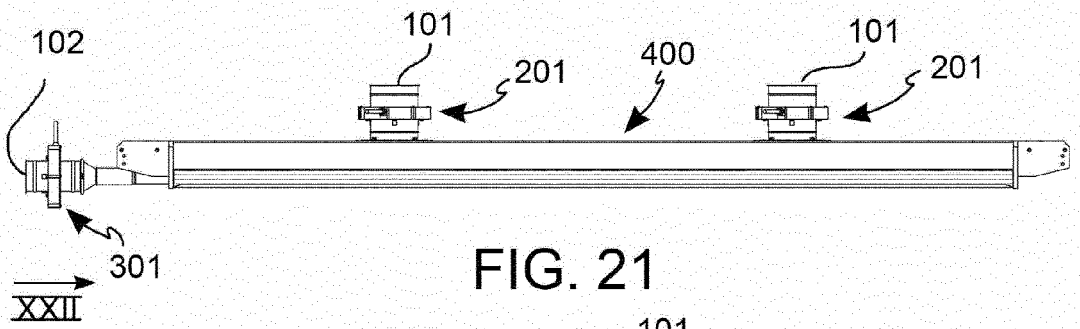

FIG. 21

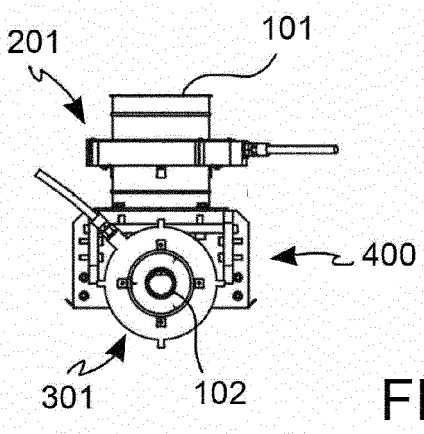

FIG. 22

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 2495

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 1 137 418 A (WILLIAM CHARLES HERBERT) 18 December 1968 (1968-12-18) * figures 1,2 * * page 2, line 29 - page 3, line 70 *	1-15	INV. B41F23/00 B26D7/18
A	EP 3 415 291 A1 (ACE DI BARBUI DAVIDE & FIGLI S R L [IT]) 19 December 2018 (2018-12-19) * figures 1-3,6,13-15 * * paragraphs [0024] - [0039], [0063] - [0067] *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

B41F
B26F
B26D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 August 2022	Hajji, Mohamed-Karim

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16-08-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1137418 A	18-12-1968	AT 290571 B	11-06-1971
		BE 694073 A	17-07-1967
		CH 468253 A	15-02-1969
		DE 1636315 A1	26-03-1970
		DK 121868 B	13-12-1971
		ES 333295 A1	01-09-1967
		FR 1512644 A	09-02-1968
		GB 1137418 A	18-12-1968
		NL 6701818 A	19-09-1967
		SE 338575 B	13-09-1971
EP 3415291 A1	19-12-2018	NONE	

EPO FORM P0459

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